prominent part being within the middle. Aperture (as inferred from sections of the whorls) transversely subreniform. Septa with a single pointed lobe on each side; dorsal lobe infundibuliform, the narrow portion being lanceolate; dorsal saddle broadly and very obtusely rounded; superior lateral lobe from one-fourth to one-third larger than the dorsal, and having much the same shape, excepting that it is proportionally wider; inferior lateral lobe consisting merely of a broad rounded sinuosity. (Surface unknown.)

Should Montfort's name *Aganides* be retained for this genus, the name of this species would become *Aganides compactus*.

Greatest diameter 2·50 inches; convexity (or breadth of aperture) 1·33 inch; breadth of umbilicus, about 1·12 inch.

Locality and position.—Coal Measures. Macoupin Co., Ill.

*Note in regard to the name "*Cincinnati Group,*" used in the foregoing paper.*

As it is now acknowledged that the rocks along the Hudson river valley, to which the name Hudson River Group had been applied, belong, as long maintained by Dr. Emmons, to a different horizon from the so-called Hudson River rocks of western New York, and the states farther westward, it seems to be an awkward misnomer to continue to apply the name Hudson River Group to these western deposits. Hence it is certainly desirable that this group should receive some appropriate and generally applicable name. Its subdivisions, it is true, have already received various lithological names, such as "Utica Slate," "Frankfort Slate," "Lorraine Shale," &c.; but as each of these names will probably be always directly associated, in the minds of geologists, with the particular subdivision to which it was originally applied, while neither of them is applicable to the lithological characters of the whole series, we cannot, without creating confusion, so extend its signification. It has recently been proposed to designate this series as the "Green and Blue Shales and Limestones;" this, however, is not a name, but descriptive phrase, and has the disadvantage of being based upon lithological characters not everywhere characteristic of these beds.

In view of all the facts, we have concluded to propose the name Cincinnati Group—(which will be adopted in the forthcoming reports of the Illinois Geological Survey)—for this series. This name possesses the advantage of being equally applicable to rocks of any color or composition, while it carries the mind to a well-known locality, where the formation referred to is extensively developed, and its fossils so abundant that they have been thence widely distributed, both in this country and Europe. Consequently, geologists will everywhere at once understand to what particular horizon of the Lower Silurian this name refers.

Descriptions of New Crinoidea, &c., from the Carboniferous Rocks of Illinois and some of the adjoining States.

BY F. B. MEEK AND A. H. WORTHEN.

Genus POTERIOCRINUS, Miller, 1821.

Poteriocrinus Indianensis, M. & W.

Body rather deeply cup-shaped or truncato-obconic. Base basin-shaped, comparatively rather broadly truncated below by the columnar facet. Basal pieces well developed, pentagonal, about one-third wider than high. Subradials large, three pentagonal, and two on the anal side hexagonal, there being no defined angle at the middle of the under side of any of these plates. First radial pieces about half as large as the subradials, wider than long, rounded on the outside, and nearly pentagonal, or with one or both of the superior

lateral angles slightly truncated, so as to give an obscurely hexagonal or heptagonal outline; all broadly truncated nearly their entire breadth above, and one on the immediate right of the anal series, resting in part directly upon the upper truncated side of one of the subradials, and elevated almost its entire length above the horizon of those of the other rays. In this latter ray, and the one on the immediate left of the anal series, the second piece is quadrangular, and wider than long, while the third is pentagonal, and supports the first division of the arms on its superior sloping sides. These divisions in the ray on the right are simple, rounded, and each composed of a single series of somewhat wedge-shaped pieces; while the left branch of the one on the left of the anal series, bifurcates again on the second piece, making three arms in this ray, which are constructed like those already described, and continue simple as far as they can be traced. In the only other ray preserved in the specimen, the bifurcation takes place on the second radial, beyond which the arms continue simple.

First anal piece nearly as large as one of the first radials, hexagonal, and resting between the upper sloping sides of two of the subradials, partly under the first radial on the right, while it connects on the left with the second anal, and supports a third on its truncated upper side. Second anal piece rather large, longer than wide, hexagonal, and resting upon the superior truncated side of one of the subradials. Third anal piece smaller than the others, hexagonal, and surmounted by several other hexagonal pieces in direct succession, belonging to the proboscis.

Surface apparently smooth. Columnar facet rather large and marked with distinct radiating striæ around the margins.

Length of body to summit of first radials, about 0·48, excepting in the ray on the immediate left of the anal series, where it is 0·58 inch; breadth about 0·56 inch. Breadth of columnar facet, 0·26 inch. Usual diameter of the arms after the bifurcations, 0·12 inch.

Locality and position.—Crawfordsville, Indiana. Keokuk division of the Subcarboniferous series.

POTERIOCRINUS (SCAPHIOCRINUS) TENUIDACTYLUS, M. & W.

Body in comparison with the length of the arms small, inversely campanulate below the summit of the first radial pieces; being narrowly rounded below and rather expanded above, where the breadth is nearly twice the height. Base less than half as wide as high, basin-shaped, the sides rounding under to the columnar facet, which is of medium size and a little concave. Basal pieces well developed, pentagonal, and wider than long. Subradial pieces twice or three times as large as the basal; those on the anterior side (the only ones seen) hexagonal. First radials wider but shorter than the subradials; transversely truncated about three-fourths their entire breadth above, for the reception of the succeeding radial pieces; those on the anterior side curving a little outwards and having an irregular pentagonal outline, the superior lateral angles being more or less truncated, or rounding inwards. Second radials pentagonal, nearly as long as wide, separated by interradial pieces of nearly their own breadth, rounded and constricted around the middle, with the central superior angle prominent, and the sloping margins on each side of it supporting the arms.

Anal pieces unknown. Arms long, slender, and in two of the anterior rays known to bifurcate on the tenth piece above the third primary radials, after which they are seen to be extended to a considerable length, without showing distinctly another division, though there is some appearance of such bifurcation in one of the branches, on the twentieth piece. Immediately after the division of the rays on the third primary radials, the arms are rounded and composed of wedge-shaped pieces, wider than long, and alternately thicker and thinner on opposite sides, each one supporting at its larger end a stout

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tentacle. Above the bifurcation on the tenth piece, the divisions are very long, slender, somewhat angular on the outer side, and still composed of a single series of wedge-shaped pieces, each one of which is strongly protuberant laterally, for the reception of a tentacle at its larger end,—the protuberances and the sinuosities between giving the divisions of the arms a zigzag appearance, somewhat like those of *Platycrinus nodobrachiatus*, Hall.*

Surface apparently smooth, or only finely granulose. Suture not impressed between the plates of the body, but somewhat gaping between the first and second radials.

Height of body to top of first radials, 0·41 inch; breadth, 0·60 inch. Length of arms to first bifurcation, 0·70 inch; entire length nearly 3 inches.

This species seems to be related to several of those described by Prof. Hall from the same locality and position, but on comparison will be found not to agree in all its characters with the description of any of them. From his *S. spinobrachiatus* it evidently differs in not having the plates of the body convex, nor the sutures indented at their angles, as well as in not having the arms subspinous, and the whole body is less broadly cup-shaped.

From *S. Whitei*, Hall, it differs in not having the "surface of cup marked by deeply impressed pits" at the junction of the sides of the subradials, and between the first radial pieces: and from *S. Halli*, Hall, it differs in not having the arms simple after the first division on the second primary radial, as well as in some of the details of their divisions.

Locality and position.—Burlington, Iowa. Burlington Limestone of Subcarboniferous series.

POTERIOCRINUS (SCAPHIOCRINUS) BAYENSIS, M. & W.

Body of medium size, rather depressed obconic below the top of the first radials. Base about twice as wide as high, expanding directly from the head of the column on a line with the subradial and first radial pieces. Basal pieces moderately developed, wider than long, pentagonal, and showing the whole surface of each in a side view. Subradials about three times as large as the basal, somewhat wider than long, three hexagonal, and two on the anal side apparently heptagonal, the angle on the middle of the under side of all being very obtuse. First radial pieces wider and a little shorter than the subradials, all pentagonal, apparently transversely truncated their entire breadth above. Second radials of nearly the same size as the first, and like them pentagonal, but having the middle angle above and more salient, while the two superior sloping sides each supports an arm, thus giving origin to two arms to each ray, or ten to the entire series; all of which are nearly in contact all around below, excepting on the anal side.

First anal piece smaller than the subradials, hexagonal in form, and resting between the upper sloping sides of two of the subradials, with its upper right edge supporting one side of one of the first radials, and its left connecting apparently with a second anal piece, the form of which cannot be made out in our specimen. In the third range, one piece evidently rested upon the upper truncated edge of the first anal piece, but its form and connection with the other pieces on the left have not been determined.

Arms long, and, as far as can be determined, apparently simple after the first division of each ray on the second radial piece; each composed of a single series of wedge-shaped pieces, alternately longer and shorter on opposite sides, but not protuberant on either side; those near the lower part about as long on the longer side as their breadth. Tentacles numerous, rather stout, and composed of joints three or four times as long as wide, and not swollen or dilated at the ends.

Column of moderate thickness near the base, where it is round and com-

*Iowa Report, p. 542.

posed of alternately thicker and thinner pieces. Surface apparently smooth Sutures slightly furrowed excepting those between the first and second radial pieces, which are distinctly gaping when the arms are folded together.

Height of body to the top of the first radial pieces, 0·25 inch; breadth of do. 0·48 inch. Length of arms above the second radials, 1·90 inches or more; diameter of column at its connection with the base, 0·13 inch.

This species seems to be closely related to *S. decabrachiatus*, Hall, (Iowa Report, p. 679, pl. xxv. fig. 1,) but is larger and more robust, and its second radial pieces differ materially in form, being nearly or quite twice as wide as long, while in *S. decabrachiatus* they are "nearly once and a half as long as wide." Its basal pieces are also proportionally about twice as large. Other differences would doubtless be apparent, if we had the means of comparing all the corresponding parts of each with those of the other.

Locality and position.—Bay City, Pope Co., Illinois. Chester division of the Subcarboniferous limestone series.

POTERIOCRINUS (SCAPHIOCRINUS)? NORWOODI, M. & W.

Body small, depressed basin-shaped, rounded and concave below, breadth three times as great as the height to summit of first radial pieces. Basal pieces very small, deeply impressed within the concavity of the under side, and almost entirely hidden by the column. Subradial pieces comparatively well developed, curving under to connect with the concave base; three pentagonal, (exclusive of the scarcely-defined angle at the middle below,) and two on the anal side hexagonal. First radial pieces short, and about twice as wide as high, pentagonal, with the upper side transversely truncated its entire breadth. Second radials as wide as the first, and twice as long, pentagonal, and at the middle above acutely angular. Arms after the first division on the second radial bifurcating at least once more, on the third or fourth piece, the joints beyond being slightly longer than wide, and supporting alternately on opposite sides of the arms strong, long-jointed, rather remotely-separated tentacles. First anal piece nearly as large as one of the subradials, pentagonal, and resting between the upper sloping sides of two of the subradials, with its right superior sloping side supporting the left under side of a first radial, and its left upper side a third anal piece, while its short left vertical side connects with the second anal piece. Second anal about the size of the first, and resting upon the short upper truncated side of one of the subradials, with its left side connecting with one of the first radials, and its right with another anal piece. Above these several other anal pieces are seen to rise so as to form apparently a narrow, rounded, lateral proboscis, on a range with the arms, which it appears to scarcely exceed in thickness. Summit and column unknown.

Surface nearly or quite smooth, excepting an angular ridge or carina, which extends up each second radial its entire length. Sutures distinct and indented a little at the connections of the corners of the first radials and the subradial pieces; that between the first and second anal pieces gaping.

Height to summit of first radial pieces, 0·05 inch; breadth, 0·15 inch.

This little species presents rather a combination of characters belonging to several groups. In the number and arrangement of its anal pieces forming a part of the walls, as well as in the general structure of its body, it agrees with *Poteriocrinus*, and its depressed form and round deeply-concave underside are characters belonging to the group *Zeacrinus*, while the form of its arms, and the distinctly gaping character of the sutures between its first and second radial pieces, suggest relations to *Scaphiocrinus*. Its apparently distinctly lateral, slender, rounded proboscis, however, would remove it entirely from the genus *Poteriocrinus* to *Cyathocrinus*. Indeed if we could be sure the latter character is real, and not produced by the accidental folding together into a cylindrical form of merely a part of the external wall of the large trunk so characteristic of the genus *Poteriocrinus*, we would not hesitate to call

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it *Cyathocrinus Norwoodi*, since the absence of the large trunk-like summit, and the presence of a slender lateral proboscis, are characters probably of more importance, than the presence of a few more anal pieces and the differences in the form of the body.

Named in honor of Prof. J. G. Norwood, of the University of Missouri.

Locality and position.—Hancock Co., Illinois. St. Louis division of the Subcarboniferous series.

POTERIOCRINUS (SCAPHIOCRINUS) SUBTUMIDUS, M. & W.

Body basin-shaped below the summit of the first radial pieces, three times as wide as high, composed of thick tumid plates. Basal plates very small, deeply impressed, and hidden by the column. Subradials comparatively large, very convex, and extending out nearly horizontally, but curving upward at their outer extremities; about as long as wide, three of them subhexagonal, and two subheptagonal, the angle at the basal or inner side being nearly obsolete. First radials convex, about twice as large as the subradials, half as high as wide, regularly pentagonal, and all nearly evenly truncated above, their entire breadth. Anal plates like the others, tumid; first one one half to one-third as large as the subradials, irregularly pentagonal, and resting obliquely beneath one side of a first radial, between the upper sloping sides of two subradials, while its left and upper side connect with the other anals. Second anal piece resting upon the truncated upper side of one of the subradials, and connecting on the left with a first radial, above which it projects nearly half its length. Third anal piece hexagonal, supported upon a short truncated upper side of the first anal, and connecting on the left with the second, and on the right with a first radial, above which it projects a little.

Second radials and parts above unknown. Surface smooth; sutures strongly defined, in consequence of the tumid character of the body plates.

Height of body to summit of first radial pieces, 0·27 inch; breadth of do. 0·73 inch; breadth of base, 0·13 inch.

Until specimens of this species can be examined, showing the structure of the parts yet unknown, it will be difficult to determine whether its name should not be more properly *Zeacrinus subtumidus*, or whether it may not belong to another group, of which *Graphiocrinus* 14-*brachialis*, of Lyon, is the type.*

This latter form differs widely, not only from *Poteriocrinus* proper, but from *Scaphiocrinus*, *Zeacrinus*, and also from *Graphiocrinus*, in having its arms composed each of a double series of interlocking pieces, as well as in its unusually massive tumid plates and general physiognomy. In some families of the Crinoidea, such for instance as the *Platycrinus* group, a difference like this in the structure of the arms may be of less importance, but in that including *Poteriocrinus* and the allied genera, we believe it to be of more significance, if not indeed of generic value, especially when accompanied by the other differences of habit presented in this instance. Hence we would propose for this group the name *Eupachycrinus*, with *Eupachycrinus* 14-*brachialis* = (*Graphiocrinus* 14-*brachialis*, Lyon) as the type. It will also doubtless include *E. pentalobus* = (*Cyathocrinus? pentalobus*, Hall,) and possibly also *Scaphiocrinus orbicularis*, Hall.

Should our species here under consideration prove to have its arms constructed of a double series of pieces, we should unhesitatingly call it *Eupachycrinus subtumidus*, since in the massive tumid character of its body pieces, small sunken base, and general form and appearance, it agrees, so far as its parts are known, essentially with the type of that group. Specifically, however, it will be readily distinguished by its subradial pieces being proportionally smaller and so much less protuberant as to give a different outline to the under side of the body, as seen in a side view. It also differs entirely in the form and arrangement of its anal pieces.

Locality and position.—Bay City, Pope Co., Illinois. Chester division of the Subcarboniferous series.

* See Kentucky Geological Report, vol. iii. p. 477, pl. i. figs. 2 and 2a.

Genus CYATHOCRINUS, Miller, 1821.

CYATHOCRINUS ARBOREUS, M. & W.

Body rather under medium size, conoidal-semiovate below the top of the first radial pieces, about as wide as high. Basal pieces well developed, forming a low basin-shaped cup; all pentagonal, and about as long as wide, the greatest breadth being slightly above the middle. Subradial pieces three or four times as large as the basal, about as long as wide, usually arcuate, or a little concave on the outside along the lateral margins—four hexagonal and one heptagonal. First radial pieces of near the same size as the subradials, and presenting a more or less nearly pentagonal outline; facet for the reception of the second radials nearly equalling one-third the breadth of the first radial pieces, slightly protuberant, and sloping outwards. Succeeding radials small, rounded on the outside, and varying from two to five in the different rays; there being but two in one of the posterior rays and five in the other, while the anterior ray has four, one of the antero-lateral three, and the other four,—all excepting the last or axillary piece being quadrangular.

After the first division into two arms on the fourth primary radial piece, (at least in one of the antero-lateral rays,) another division immediately takes place on the first piece of each principal branch, and of the four branchlets thus formed, the inner two ascend directly upwards, and each bifurcates again on the second piece, and the subdivisions each again on the third piece; while the two main lateral branchlets spread out on either side, each giving off above two or more subordinate branchlets, the first of which is seen to bifurcate at least once. The whole of the divisions and subdivisions being thus spread out so as to resemble the trained limbs of a tree spread upon a wall. The divisions of the other rays cannot be traced out in the specimen examined, in the same detail, but some of them appear to divide much in the same way, and others somewhat differently.

All the arms and their divisions are rounded, and the smaller divisions composed of joints that are longer than wide, while no tentacles have been observed connected with any of them.

The first anal piece is quadrangular, a little longer than one of the basal pieces, and rests directly upon the superior truncated side of one of the subradials, while it connects on each side with one of the large first radial pieces, above which it does not project. Other anal pieces unknown.

The sutures are slightly impressed, and the surface nearly smooth, or only obscurely granulose. The column and summit are unknown.

Height to summit of first radial pieces, 0·66 inch, on the anal side, and 0·55 inch on the other; breadth at top of first radial pieces, 0·53 inch; breadth of second and succeeding primary radial pieces, 0·15 inch.

Locality and position.—Crawfordsville, Indiana. Keokuk division of Subcarboniferous series.

Genus PLATYCRINUS, Miller, 1821.

As first proposed by Miller, this genus was badly defined, and it is manifest that its author himself, had no very clear ideas of its limits, since he also included in it species of *Pentremites*, Say, *Dichocrinus*, Munster, and of his own genus *Actinocrinus*. Later writers, however, have restricted it within far more natural limits, and, as now generally understood, Miller's first species, *P. lævis*, seems to be regarded as the typical form of the genus. In this and the closely allied species, the body is more or less hemispherical below the arms, while the dome terminates above in a long, generally slender, central or subcentral proboscis, closed at the summit, but apparently pierced by a small aperture on one side near the upper extremity. In these typical forms the arms bifurcate once or oftener near the body, beyond which they are simple, and composed at first, of a single series of wedge-shape pieces, passing more or less gradually

into a double series of small interlocking pieces supporting numerous tentacles. Other species, however, generally included in the genus, have no proboscis, but a simple aperture in the summit, located either laterally, or nearly centrally; while some of these have the arms composed of a double series of interlocking pieces, and others of a single series of wedge-shaped pieces,* neither of these peculiarities in the structure of the arms being always especially coincident with apparently any one of the other characters mentioned.

As defined by Koninck and Le Hon†, in accordance with their improved nomenclature of the parts, the structural formula of this group is as follows:—

Basal pieces, 3; forming a wide cup.

Radials, 2; one large and one small, × 5.‡

Anals, 1 large, or 3 small.

Interradials, 1, × 4.

Arms, 10, 20, 25, 30 or 35, according to the species.

From the foregoing remarks, it will be seen, that the group including species agreeing with the above formula, may be divided, as (in part) suggested by the Messrs. Austin,§ into the following four sections:—

1. *Platycrinus*, (typical).—With the summit terminating in a more or less elongated, central, or subcentral proboscis, bearing the opening on one side near the upper extremity.

Type. *P. lævis*, Miller. Also includes *P. spinosus*, and *P. 30-dactylus*, Austin; *P. Müllerianus*, Koninck; and *P. granulatus*, Miller.

2. *Centrocrinus*, Austin.—Opening of summit nearly or quite central, but not elevated upon a proboscis.

Type. *P.* [*Centrocr.*] *gigas*, Gilbertson.

3. *Cupellæocrinus*, Troost.—Differs from the last only in having its second radial pieces merely rudimentary, or so small as to allow the first brachials to rest partly upon the first radials.

Type. *P. Tennesseensis*, Roemer.

4. *Pleurocrinus*, Austin.—Differs from *Centrocrinus* only in having the opening of the summit lateral, and nearly or quite on a line with the arm bases

Examples.—*P.* [*Pleurocr.*] *mucronatus*, Austin; *P.* [*Pleurocr.*] *tuberculatus*, Miller; *P.* [*Pleurocr.*] *tuberosus*, and *P.* [*Pleurocr.*] *subspinosus*, Hall; *P.* [*Pleurocr.*] *asper*, Meek & Worthen, &c., &c.

In regard to the value and importance of the characters distinguishing these sections, Palæontologists will probably always differ. Hitherto these differences have scarcely been noticed, even by the most respectable authorities, excepting as one of the means of distinguishing species. From all analogy, however, it seems reasonable to suppose that they were accompanied by corresponding modifications in the structure of the softer parts of the animal. It will also be observed, that they correspond, in part, almost exactly to the characters distinguishing sections of the allied *Actinocrinus* group. For instance the species embraced in the section *Pleurocrinus*, differ from the typical forms of *Platycrinus*, almost precisely as *Agaricocrinus* and *Amphoracrinus* do from the

*P. *nodobrachiatus*, Hall, is an American example with the arms composed of a single series of pieces. We allude here to a species described under that name by Prof. Hall, in the Iowa Report, p. 542, 1858, and not to another form described by him under the same name, in his "Descriptions of New Species of Crinoidea, &c." Albany, Feb. 25, 1851, p. 17. The inconvenience and confusion liable to result from the use of the same specific name for two forms of the same genus, makes it necessary that another name should be applied to one of these species; hence we would propose to call that described at the latter date, *P. perasper*.

†Recherches Sur les Crinoides du Terrain Carbonifere de Le Belgique, p. 155, 1854.

‡It is worthy of note that although Koninck and Le Hon give two radials (one large and one small) as the number, that their figure 1 a, pl. vi. of *P. lævis*, Miller, shows clearly 3 radials, one large and two small. As others figure and describe it as having only two, this may be only an accidental variety. It will be seen, however, that our *P. parvulus*, described on another page of this paper, has 3 radials, one large and two small. Still two seems to be the normal number in this genus.

§Monograph of Recent and Fossil Crinoidea, p. 6.

typical species of *Actinocrinus*. Hence, if we admit these latter groups, either as genera or subgenera, consistency at least, if not indeed a philosophical system of classification, would require that equal prominence should be given to these corresponding sections of the *Platycrinus* group. Whatever theoretical views may be entertained on this subject, however, the practical difficulty of ascertaining the nature of the summit, and the position of the aperture in palæozoic crinoids, will prevent the general distribution of the species into groups, upon characters of this kind, unless a more profound study of great collections of the remains of these animals, may yet bring to light some coincident, but more easily observed characters, in the structure of the body, or other parts.

PLATYCRINUS NIOTENSIS, M. and W.

Body below the summit of the first radial pieces cup-shaped, wider than high; sides slightly ventricose above the base. Base basin-shaped, several times as wide as high, moderately expanding, rather broadly truncated below, its lower margins projecting slightly downwards around the end of the column, and provided with three very small projections, one at the lower extremity of each of its sutures. First radial plates large, higher than wide, widening slightly from below upwards, subquadrangular or with the superior lateral angles a little truncated by the interradial pieces; each with a concave facet for the reception of the second radials, equalling about half its breadth above, and excavated near one-fourth its length on the outer side, below the upper margin. Second radial pieces trigonal, very small, or scarcely filling the facet or excavation in the upper side of the first radials; rounded below, with each superior sloping side supporting secondary radials, on the second of which another bifurcation takes place, making four arms to each ray.

Arms after the second division described above, simple, and at first composed each of a single series of wedge-shaped plates, but soon passing into a double series of small interlocking pieces, supporting on each side of the arms closely arranged series of long-jointed tentacles.

Column near the base compressed and tortuous, being composed of alternately thicker and thinner elliptic pieces, with a very minute central perforation.

Surface somewhat granulose; sutures not grooved, nor distinctly apparent; those between the basal pieces indicated by a faint linear ridge.

Height to summit of first radials, 0·30 inch; breadth about 0·40 inch. Greater diameter of column at base of body, 0·12 inch; smaller do. 0·09. Breadth of one of the arms, 0·06 inch; length of do. apparently an inch or more.

In its general appearance, this species is not unlike *P. sarœ* of Hall, (Iowa Report, p. 673, pl. 18, fig. 4), though it is much smaller, has a proportionally much shorter base, and also differs in having but four, instead of six arms to each ray.

Locality and position.—Niota, Hancock County, Illinois. Keokuk division of Subcarboniferous Limestone.

PLATYCRINUS HEMISPHÆRICUS, M. and W.

Body rather above medium size, hemispherical, being rounded below, and about twice as wide as high; base broad basin-shaped, and forming about one third the entire height of the cup, with a pentagonal outline as seen from below; columnar facet between one-third, and one-fourth the diameter of the base, and subelliptical in outline. First radial pieces larger than the basal, wider than high, nearly quadrangular, and widening moderately from below upwards; facet for the reception of the second radial one third as wide as the summit, and extending down about one fourth the length of the plates,—concave and sloping outwards, with a deep notch within. Second radial pieces very small, but filling the cavity in each of the first radials, from which they

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extend out nearly horizontally—pentagonal in outline, and each supporting on its superior lateral sloping margins the first divisions of the arms, which are comparatively small and bifurcate again on the second piece; beyond this the two outer divisions remain simple, but the two inner divide again on the second piece, making six arms to each ray, or thirty to the entire series. Arms after the last divisions long, slender, cylindrical, and composed at first of a simple series of quadrangular pieces, but passing gradually upwards into interlocking triangular pieces, and still farther up forming a double series of small alternating cuneiform pieces, supporting closely arranged, long-jointed tentacles. Anal, interradial, and vault pieces unknown. Sutures, excepting between the basal pieces, distinctly, but not widely or deeply channeled.

Surface ornamented with rather small, but well defined, prominent nodes. On the base, these nodes are arranged in ten rows, five of which radiate from the columnar facet. one to each of the corners; while those between each of these form intermediate radiating rows, consisting at first of a single range, but becoming a double or triple range near the margin, when the three sometimes coalesce laterally. On the first radial pieces two rows pass from just beneath the facet for the reception of the second radials, to each of the inferior lateral angles, while between these there is, at first, a single node, but farther down two or three rows, consisting of nodes which show a disposition to elongate, or coalesce laterally, so as to form little transverse ridges. Above, there is also a row extending horizontally to each superior lateral angle, with a few less regularly arranged nodes on the sides below these. A single transversely elongated node sometimes also occurs on the little radials, and one less distinctly defined also sometimes on each of the pieces between this and the next bifurcation.

Breadth of body at summit of first radial pieces, 1·07 inches; height of do. 0·60 inch; breadth of base 0·67 inch; breadth of second radial pieces at the summit, 0·54 inch; do. of second radials, 0·19 inch.

From the description, it will be seen this species is rather closely related to *P. granulatus* of Miller, which it nearly resembles in form and general appearance. It is a larger and more robust species, however, and differs, not only in the arrangement of the pustules on the base into distinct radiating rows, but according to Austin's figures and description (*Monogr.*, Recent and fossil Crinoidea, p. 33, pl. 3, f. 2,) in having but six instead of seven arms to each ray, as well as in having the arms above the middle composed of a double series of small wedge-shaped pieces, instead of consisting of a single series throughout. From its analogy to *P. granulatus*, of Miller, it will probably be found to possess, like that species, a long subcentral proboscis.

Locality and position.—Crawfordsville, Indiana. Keokuk division of Subcarboniferous Series.

Platycrinus parvulus, M. and W.

Body very small, short subcylindrical, or deeply cup-shaped. Base depressed basin-shaped, or several times as wide as high, columnar facet about one third as wide as the base, with a small marginal rim. First radial plates nearly oblong, being longer than wide, with nearly parallel sides; some of them with two obscure linear ridges extending from the middle of the upper side, and slightly diverging to the base; each moderately concave above for the reception of the next range of pieces. Second radial pieces very minute, about twice as wide as long, but not equalling the breadth of the slight concavity in the upper side of the first radials. Third radial pieces, slightly wider than the second, and about of the same length, pentagonal, and each supporting an arm on each superior sloping side. Arms each dividing on the second piece beyond which they are simple, at least for four or five pieces above, and composed of a single series of quadrangular pieces, about as long as wide, excepting the first, which is near twice as long as wide. Tentacles apparently

comparatively stout. Column near the base nearly or quite round, and composed of very thin pieces. Surface smooth.

Length of body to summit of first radial pieces 0·12 inch; breadth of do. 0·12 inch. Length of arm about 0·30 inch; thickness of column, 0·02 inch.

This very small species, differs remarkably from all the others with which we are acquainted, resembling it in other respects, not only in its small size, but in having two minute radial pieces in each ray, above the larger first radial piece, making three radials to each ray.

Locality and position.—Pope County, Illinois. Chester division of Subcarboniferous Series.

Genus ACTINOCRINUS, Miller, 1821.

Subgenus ALLOPROSALLOCRINUS, Lyon & Casseday, 1860.

ACTINOCRINUS (ALLOPROSALLOCRINUS) EUCONUS, M. & W.

Body having the form of the subgenus remarkably well developed, being perfectly flat or slightly concave below the arm bases, and regularly conical above, where it terminates in a rather slender central proboscis. Base very small, with a round, deep, conical depression for the reception of the column, occupying almost its entire area, and surrounded by a narrow, slightly projecting ring-like margin. Radial, interradial, anal and first brachial pieces, all extending out horizontally from the base. First radial pieces hexagonal and about twice as wide as long. Second radials transversely oblong, and rather smaller than the first. Third radials a little larger than the second, pentagonal or hexagonal in form, and each supporting on its superior (more properly outer) sloping sides two slightly larger secondary radials, each of which is succeeded by another, and the latter each by two brachial pieces, making four arms to each of two rays seen, or twenty to the entire series, if the others have the same number. First interradial pieces larger than any of the radials, heptagonal or octagonal, and supporting two smaller pieces in the next range, beyond which are two others, making altogether five pieces in the only interradial area we have been able to make out clearly. Anal pieces unknown.

Vault regularly conical, with slightly convex slopes, and armed around the middle with two or three rows of irregularly disposed, short, conical spines, or spine-like tubercles. Proboscis slender and apparently not inclined to either side.

Surface smooth, or indistinctly granulose; sutures very close fitting and difficult to see. Arm bases forming an almost continuous series (being but very slightly interrupted at the anal and interradial spaces) around the base of the abruptly truncated conical body. Column unknown.

Height to base of proboscis, about 0.70 inch; breadth, 1.13 inches.

This species is remarkable for its conical form, being almost perfectly flat, or a little concave below the horizon of the arm bases, and rising with slightly convex slopes above, to the base of the proboscis. Hence the whole of the cavity occupied by the viscera of the animal corresponds to the dome only of species of the usual form of *Actinocrinus*. For the group to which it belongs, Messrs. Lyon & Casseday proposed the name *Alloprosallocrinus* in 1860, and Dr. Troost had proposed for it the name *Conocrinus*, in a list published without a description in 1850.

Since the above was in type, a more careful comparison with Lyon & Casseday's description of their *A. conicus* leads us to suspect that our crinoid *may* be identical with their species. Still we do not feel satisfied that this is the case, particularly as they describe the columnar facet as involving the basal and part of the surrounding range of pieces; while it is very small in our crinoid, not even covering the small basal pieces. In addition to this, our specimens seem to show the bases of a more numerous series of arms.

[Aug.

Locality and position.—Six miles southeast of Anna, Union Co., Illinois; from the St. Louis division of the Subcarboniferous series. Collected by Mr. Henry Engelmann.

PENTREMITES (GRANATOCRINUS?) GRANULOSUS, M. & W.

Body small, subglobosus, base deeply concave, particularly in the middle, and not visible in a side view. Radial plates a little longer than wide, about two-thirds as long as the entire body, and tapering from above to the base, each divided by the narrow pseudo-ambulacral areas, down almost to the very base; lateral margins moderately prominent. Interradial pieces subtrigonal, or with a fourth obscure angle in the middle below; longer than wide, and each narrowing from below to the summit, where they are perforated by two minute openings. Anal piece of the same size and form as the interradial, with its opening circular, and comparatively large, its outer margin being protected by a small, rather pointed node. Pseudo-ambulacral areas narrow, or sublinear, rather impressed, and each with a distinct longitudinal, linear, mesial furrow; pore pieces from twenty-five to thirty. Surface marked by comparatively distinct granules, most strongly defined on the interradial and anal pieces, where they sometimes show a tendency to arrange themselves in transverse lines parallel to the lower margin.

Height of body, 0·22 inch; breadth of do. 0·23 inch. Breadth of pseudo-ambulacral areas, 0·05 inch.

Not having at hand a specimen or figure of the type of Troost's *Granatocrinus*, we are not quite sure this form belongs to that group, though we have no doubt in regard to the propriety of separating such species from the typical forms of *Pentremites*. Our species has somewhat the general form and appearance of *P. Roemeri* of Shumard, (Missouri Report, pl. b, figs. 2a, 2b, 2c and 2d,) but differs too widely to render a detailed comparison necessary.

Locality and position.—Keokuk division of Subcarboniferous series, near Warsaw, Illinois.

POLYZOA.

Genus EVACTINOPORA, M. & W.

EVACTINOPORA RADIATA, M. & W.

The interesting fossil upon which we propose to found this genus and species is entirely silicified, and, as seen from below, presents the form of a regular eight-rayed star, the rays being slender, and nearly equalling in length the diameter of the nucleus. In a side view, however, it is seen to be regularly rounded in outline below, while the slender rays are observed to be produced upwards in the form of thin vertical laminæ, which converge to the centre over the nucleus. The specimen is not in a condition to show whether or not there is a central axis extending all the way up, but there probably is. The rays are thickest below, and taper gradually upwards on their outer margins, which are beveled or carinated all the way down to where they meet at the middle of the under side. Within, they each pass abruptly into a thin lamina, which is poriferous on both sides, and extends to the middle over the nucleus.

The pores are circular, with a slightly prominent margin, and regularly disposed nearly in quincunx, at intervals about equalling their own diameter, or sometimes less. They only exist in the thin portion of each ray, while the thicker outer and inferior portions seem to be nearly or quite solid.

We are not able to determine satisfactorily whether this was a free or an attached Bryozoon; but if attached, the stem or point of attachment was probably very small.

Greatest transverse diameter to the extremity of the rays, 0·90 inch; do. of nucleus between the rays, 0·35 inch; thickness of the outer margin of each ray near the nucleus, 0·10 inch; diameter of pores about 0·02 inch.

Locality and position.—The only specimen of this fossil we have seen is in a granular mass of decomposing chert, containing some fragments of small crinoid columns. It was obtained from the Subcarboniferous rocks of Missouri, but the exact locality and position we have been unable to ascertain.

Note on the genus GILBERTSOCRINUS, Phillips.

BY F. B. MEEK.

Genus GILBERTSOCRINUS, Phillips, 1836.

Gilbertsocrinus, Phillips, Geol. Yorkshire, part ii., p. 207, 1836.
Goniasteroidocrinus, Lyon and Casseday, Am. Jour. Sci. xxviii. p. 233, 1859.
Trematocrinus, Hall, Sup. Iowa Report, p. 70, 1860.

Phillips' diagnosis of this genus reads as follows:

"Basal joints five, forming a pentagon; suprabasal [subradials] five, hexagonal, forming a decagon with five re-entering angles, from which proceed five heptagonal first costals [first radials] and five hexagonal second costals, [second radials], bearing a pentagonal scapula [third radial] supporting joints [secondary radials] which combine into rounded arms perforated in the centre. First intercostals [first interradials] pentagonal. The following species have been usually referred to *Rhodocrinus*, Miller, from which, it appears to me, they differ entirely." (Phillips.)

He mentions but the following three species, viz., *G. calcaratus*, *G. mammillaris* and *G. bursa*, all from the subcarboniferous. His specific descriptions are very brief and unsatisfactory, but his figures are tolerably good, and give a sufficiently intelligible idea of the generic characters of the group. From these figures, and his description, it is therefore evident that the formula, in accordance with the later improved nomenclature, may be stated as follows:

Generic formula of Gilbertsocrinus.

Basal pieces 5.
Subradials 5.
Radials 3×5.
Secondary or supraradials 3 or 4×10.
Anal and interradial pieces 12 to 15×5.
Pseudo-brachial appendages (arms of some authors) 5, located over the rays.
Arm-openings (ambulacral,) 10, located directly under the pseudo-brachial appendages.

On comparing this formula with the following, given by Messrs. Lyon and Casseday, of *Goniasteroidocrinus*, cited above, the close relations of these crinoids will be apparent.

Generic formula of Goniasteroidocrinus.

Basal pieces 1×5, pentagonal, perforation not visible.
Subradial pieces 5, hexagonal, nearly equal in size.
Primary radial pieces 3×5, first spiniferous.
Secondary radials 3×10, hexagonal.
Interradial fields [including the anal area] 5×13 to 14, [pieces each].
Interbrachial fields 5×1 to 9, [pieces each].

It may be proper to explain that the term pseudo-brachial appendages is used in the formula of *Gilbertsocrinus*, for the parts regarded by Phillips and by Messrs. Lyon and Casseday as arms, and that arm-openings, not alluded to by Phillips in his description, though clearly shown in his figur. s, are mentioned. These openings were not observed by Lyon and Casseday, because they were hidden in their specimens by the attachment of the small pendulous true arms, or, in the absence of the latter, by portions of the matrix, as is known to the writer from the examination of specimens of their typical species loaned by Mr. Lyon.

[Aug.